BROOKHAVEN NATIONAL LABORATORY Safety & Health Services Division INDUSTRIAL HYGIENE GROUP Standard Operating Procedure: Field Procedure	NUMBER **IH96300** REVISION **FINAL Rev 3**
SUBJECT: INSTRUMENT OPERATION: **GenRad 1565-B** **General Purpose Sound-Level Meter**	DATE **07-14-04** PAGE **1** OF 14

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1.0 Purpose/Scope

This procedure provides a standardized method for the operation of the GenRad GR1565-B Sound Level Meter. It should be used in conjunction with the SBMS Subject Area *Noise and Hearing Conservation* and IH SOP IH96200: *Noise Measurement Principles: Area Surveys.*

The GenRad 1565-B provides a method for easy and accurate surveys of workplace noise exposures. This meter is a Type 2 General Purpose meter and meets ANSI specifications. This area survey meter should be used to determine the baseline noise levels and area noise levels. Its use is designed for conducting noise surveys to determine the need for area warning posting and locate problem-noise sources.

The GenRad 1565-B can be used as a screening tool to determine the need for personal monitoring and to sketch isometric lines for control area delineation. Generally, employee exposure assessments should be made with a noise dosimeter. However this area survey meter can be used in limited situations for exposure assessments, such as for operations that are of short duration and involve limited employee movement. This allows the meter to measure the actual employee exposure. In these cases, the meter reading must be observed over the entire time of exposure.

2.0 Responsibilities

2.1 Use of the GenRad 1565-B shall be limited to persons who act under the direction of a competent hazard assessment person and have demonstrated the competency to satisfactorily use the meter, as evidenced by experience and training, to the satisfaction of their supervision or existing qualification criteria set by their organization.

2.2 Personnel that perform exposure monitoring with this instrument are responsible to follow all steps in this procedure.

2.3 The data collected using this meter must have an appropriate evaluation of the hazard and risk by a skilled Industrial Hygiene professional.

3.0 Definitions

3.1 *Decibel (dB):* A non-dimensional unit used to express sound pressure levels. It is the log of the ratio of the measured sound pressure level to a reference level.

- *dBA:* A sound pressure level in decibels made on the A-scale of a sound level meter. This unit of measure approximates the response of the human ear.
- *dBC:* Sound pressure based on a nearly flat, non-weighted scale.

3.2 *Frequency:* The number of cycles completed by a periodic quantity in a unit time. Unit, hertz (Hz) measures cycles per second.

3.3 *Impulse or Impact Noise Levels:* Variations in noise levels that involve peak levels spaced at periods of greater than one per second. Where the intervals are less than one second, it should be considered a continuous noise source.

3.4 *Occupational Exposure Limit:* The maximum time weighted average (TWA) exposure permitted for employee exposure, based on the less of the OSHA Permissible Exposure Limits (PEL) or ACGIH Threshold Limit Value (TLV). See IH96200.

4.0 Prerequisites

4.1 **Training prior to using this meter:**

4.1.1 Demonstration of proper operation of the instrument to the satisfaction of the employee's supervision. Refer to Section 7 *Implementation and Training.*

4.1.2 Other appropriate training for other hazards in the area to be entered may be needed. Check with ESH coordinator or FS Representative for the facility.

4.1.3 Noise and Hearing Conservation Training and a Baseline audiogram may be needed if the duration of exposure to the person performing the survey will be

in excess of the OSHA Permissible Exposure Limits (PEL) or ACGIH Threshold Limit Value (TLV) (which ever is less). See IH96200.

4.2 **Area Access**:

4.2.1 Contact the appropriate Facility Support Representative or Technician to obtain approval to enter radiological areas.

4.2.2 Verify with the appropriate Facility Support Representative or Technician if a Work Permit or Radiological Work Permit is needed or is in effect. If so, review and sign the permit.

4.2.3 Use appropriate PPE for area.

5.0 Precautions

5.1 Hazard Determination:

5.1.1 The operation of this meter does not cause exposure to any chemical, physical, or radiological hazards. The meter design does not cause significant ergonomic concerns in routine use. The meter does not generate Hazardous Waste.

5.1.2 By its very nature, the GenRad meter may be used in areas where excessive noise levels exist or are suspected to be present. Exposures to noise levels above the PEL and/or TLV may cause temporary or permanent hearing loss.

5.2 Personal Protective Equipment:

5.2.1 In areas where noise levels exceed the *Occupational Exposure Limit (OEL)*, hearing protection should be worn. The hearing protection should be able to reduce the noise levels below the OEL. See IH96200 for guidance on PPE selection.

5.2.2 Additional PPE: Other appropriate PPE for the area being entered. Check with your ES&H representative.

6.0 Procedure

Equipment: (Pictured in Appendix 9.1)

- Meter Body

- Microphone protective cap (white plastic cap)
- Microphone windscreen (foam ball)
- Calibrator

Operation of the GenRad (picture of meter and description of controls and displays is contained in Appendix 9.1.)

6.1. **Turning the meter on:** Slide the Power switch (**ON →**) to the right.

6.2. **Battery Check**

6.2.1. Press *BAT Check* and hold it there briefly.

6.2.2. Verify that the meter needle moves into *BATTTERY* area of the scale. If it does not, replace the batteries.

6.2.3. Perform the battery check at least once every half hour of use.

6.3. **Warm-up:** A warm-up is not required for this meter.

6.4. **Calibration:**

6.4.1. Verify that the calibrator battery checks ok.

6.4.2. Slide the *Power Switch* to *ON*.

6.4.3. Depress the *WEIGHTING* switch for *A*, and depress *Detector* switch to active *SLOW*. Select the ***110 to 120 dB*** range.

6.4.4. Turn the calibrator on and select 1000 Hz (1kHz).

6.4.5. Place the calibrator, with coupler/adaptor installed, over the microphone of the sound level meter (SLM).

6.4.6. Observe that both the SLM pointer and the digital display indicate *114* (plus or minus 0.5 dB). If the indication is outside this range, adjust the *CAL* control.

6.4.7. Record reading on *Noise Area Survey Form.*

6.5. **Operation:**

6.5.1. Select the desired weighting by depress one of the switches marked *A, B,* or *C*.

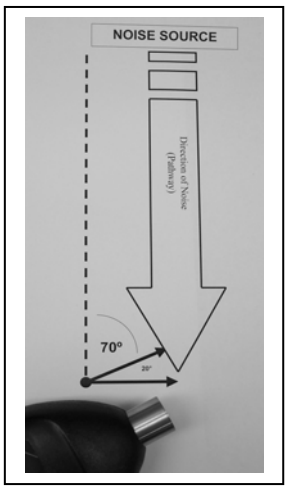
6.5.2. Select the desired detector response characteristic by depressing the *SLOW* switch: up for Fast response and down for Slow response.

6.5.3. Adjust the *dB RANGE* knob for an on-scale meter indication and read the meter.

6.6. **Operator Position:** Preferably the operator should be further from the sound source than the microphone and positioned as to reduce reflection of the sound to the meter. Hold the meter at arms length.

6.6.1. DO NOT stand between the sound source and microphone.

- DO NOT place the hand within 12 cm (5 inches) of the microphone. (For most accurate measurements, connect the microphone to the cable supplied, and remove both sound-level meter and observer from the sound field.)
- The microphone is a "flat-random-incidence-response type". Do not point the meter at the source, hold it at a 70-90 degree angle, i.e., take the measurement so that the path from the noise source to the microphone is along a 70^0 to 90^0.)
- Take measurements at ear level of employee (sitting, standing or bending) to estimate personal exposures and to locate isometric lines of noise intensity on a sketch for defining area levels.



6.7. **High Wind Area:** Install the wind screen (foam ball) over the microphone.

6.8. **Recording readings:**

6.8.1. Use the BNL Direct Reading Sampling Instrument Form to record readings (see the IH web page for the most recent version).

6.8.2. Return meter and original sampling form to the SHSD IH Laboratory daily or at the end of each project as agreed to by the IH Laboratory Technician.

6.8.3. Send a copy of any hazard evaluation report written on the survey to the IH Laboratory and the Occupational Medicine Clinic.

6.8.4. Post-calibrate (i.e. single point operational accuracy check) the meter as per the Instrument Operation SOP.

7.0 Training and Implementation

7.1 Training prior to using this meter:

7.1.1 Demonstration of proper operation of the instrument to the satisfaction of the employee's supervision.

7.1.2 Other appropriate training for the area to be entered (check with ESH coordinator or FS Representative for the facility).

7.1.3 Noise and Hearing Conservation Training and a Baseline audiogram may be needed if the duration of exposure to the person performing the survey will be in excess of the OSHA Permissible Exposure Limits (PEL) or ACGIH

Threshold Limit Value (TLV) (which ever is less). See IH96200.

7.2 For the SHSD IH Group personnel:

7.2.1 Qualification on this JPM is required on a 3 year basis, providing the professional is monitoring noise sources frequently.

7.2.2 Personnel are to document their training using the Attachment 9.5 with its *Job Performance Measure Completion Certificate* for this meter.

7.2.3 This qualification is used in conjunction with the *Job Performance Measure Completion Certificate: IH Group Member NHC Hazard Assessor* from IH96120.

8.0 References

8.1 GenRad GR 1565 Sound-Level Meter Instruction Manual.
8.2 BNL SBMS Subject Area *Noise and Hearing Conservation.*
8.3 OSHA Noise/Hearing Conservation 29CFR1910.95.
8.4 NIOSH Criteria for a Recommended Standard-Occupational Noise Exposure, 1998.
8.5 ACGIH American Conference of Governmental Industrial Hygienists Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices.

9.0 Attachments

9.1 Photo of meter and parts
9.2 Theory of Operation
9.3 Short List of Operating Instructions
9.4 Noise Area Survey Form
9.5 Meter Operation Qualification form- Job Performance Measure

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10.0 Documentation

Document Review Tracking Sheet		
PREPARED BY: *(Signature and date on file)* **R. Selvey** **Author** **Date 02/26/01**	**REVIEWED BY:** *(Signature and date on file)* **J. Peters** **SHSD IH Group** **Date 02/20/01**	**APPROVED BY:** *(Signature and date on file)* **R. Selvey** **SHSD IH Group Leader** **Date 02/27/01**
RCD Facility Support Procedure Committee Review **03/29/10**		RCD Approved By / Date: Procedure Committee Review
Filing Code: **IH52QR.01**	**DQAR** **Date**	**Effective Date:** **02/27/01**

Periodic Review Record		
Date of Review	Reviewer Signature and Date	Comments Attached
03/09/01	*(Signature and date on file)* R. Selvey	Renumbered to new system from former number of IH-FP-106. Minor text changes made regarding SOP numbers. Survey Form inserted.
04/20/01	*(Signature and date on file)* R. Selvey	Revised to include RCD Facility Support Procedure Committee Review comments.
04/27/01	*(Signature and date on file)* R. Selvey	Correct error on calibration range from 5 db to 0.5 dB in step 6.2.1.4.6.
06/08/01	*(Signature and date on file)* R. Selvey	Clarified wording on pre and post calibration to reinforce policy in IH51660.
04/12/04	*(Signature and date on file)* R. Selvey	Revised format with Section 7 as Implementation and Training. Updated references to SBMS. Updated reference to JPM in IH96120.
07/14/04	*(Signature and date on file)* R. Selvey	Added Attachment 9.5. Change in Section 7.

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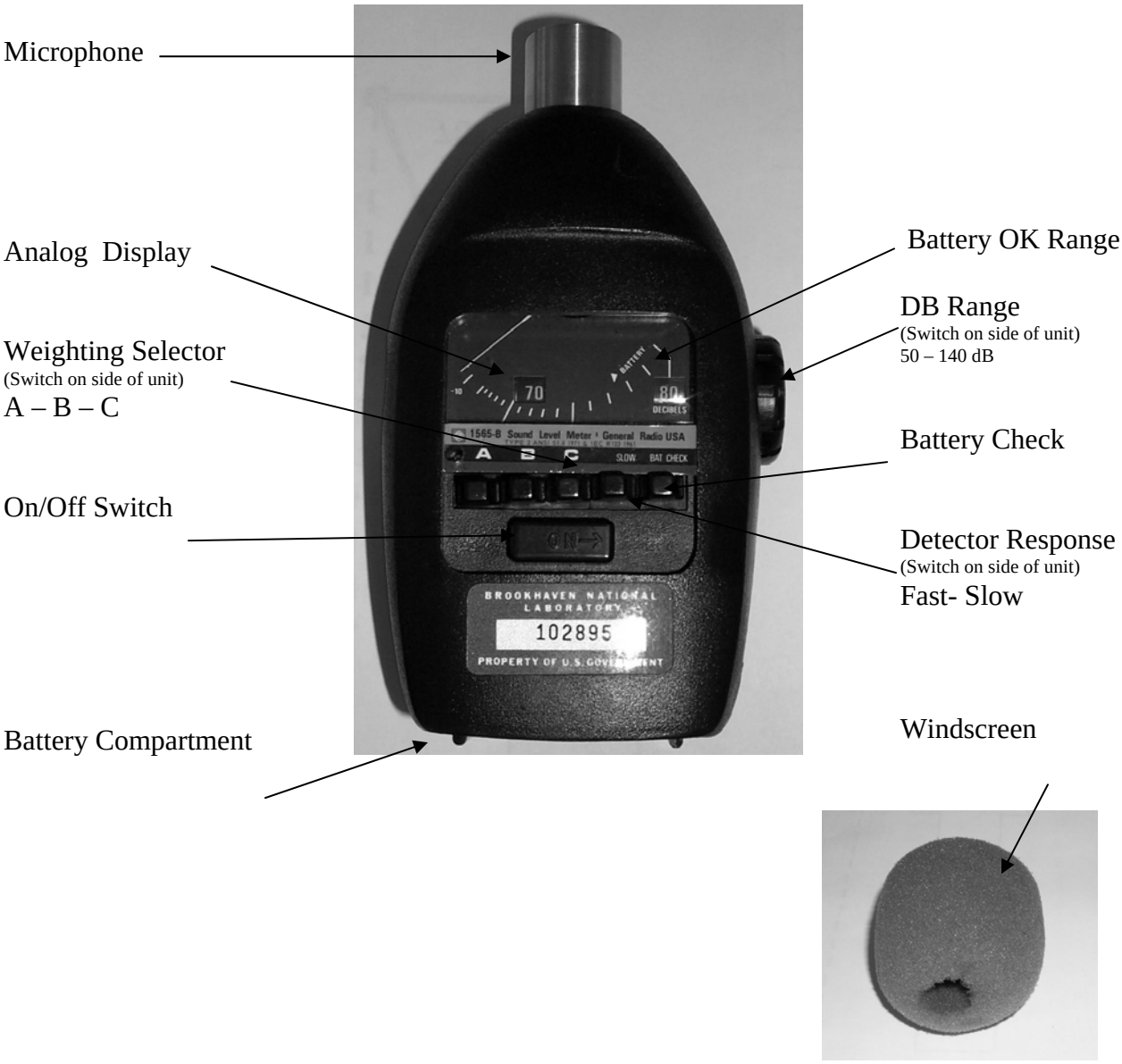
Attachment 9.1

Photo of the Meter and Parts



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Attachment 9.2

Theory of Operation

The GenRad GR 1565-Bis a general purpose sound level meter which incorporates A, B, and C weighting networks, as well as FAST and SLOW detector response. The sound pressure is displayed on a linear analog only scale.

Weighting Networks. The meter contains three weighting networks, A, B, C, which shape the noise to discriminate against the frequency components of the measured noise.

- *A Network*: Simulates subjective responses to noise. Generally used in noise surveys to locate noise hazards. The A Network discriminates the low frequencies quite severely Most regulations require that noise be measured on the A-weighting scale.
- *B Network*: Moderately discriminates (filters) against low frequencies
- *C Network*: Barely discriminates (filters) against low frequencies.

If measured sound levels of noise are much higher on the C-weighting than on the A- weighting, much of the noise is contributed by the low frequencies.

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Attachment 9.3

Short Operating Instructions

	Step	User Action	Meter Display
1	**Power On**	Slide power switch to right	
2	**Battery Check**	Depress the *BAT Check* switch to battery – hold briefly.	Needle should move to the Battery Range or do not use.
3	**Pre-Calibration**	Power switch ***ON*** Weighting Switch to ***A*** Detector Switch to ***SLOW*** Turn Calibrator on and place over microphone of meter (using coupler/adaptor), set meter at 1 kHz	Select 110-120 dB range: meter reading of *114* (plus or minus 5 dB) is acceptable.
4	**Operation**	Slide Weighting Switch to ***A, B,*** *or* ***C.*** Slide Detector Switch to ***FAST*** or ***Slow*** Adjust ***dB range*** knob to keep needle on scale	Needle should move to indicate noise level, minor fluctuations are expected.
5	**Operator Position**	Stand at the same distance from sound source as the microphone. Hold Meter at arms length.	
6	**Post-Calibration**	Repeat Step 3	
7	**Documentation**	Record data on Direct Reading Instrument Form-Noise survey Form. Return meter and form to IH Lab.	

Attachment 9.4

Noise Area Survey Form

(next page)

(form is a two sided copy)

BROOKHAVEN NATIONAL LABORATORY
ENVIRONMENTAL Safety Health and Qualification Directorate

SOUND PRESSURE LEVEL SURVEY
NOISE MEASUREMENT FORM

DATE:	SURVEYOR(S):

I. AREA INFORMATION

DEPT:	BLDG:	ROOM:
SOURCE:		
ENGINEERING CONTROLS:		

II. EMPLOYEE INFORMATION

FIRST NAME:	LAST NAME:	BNL #:
DEPT:	BLDG:	JOB TITLE:
EXPOSURE DURATION (HRS):	EXPOSURE (TIMES PER DAY):	EXPOSURE (DAYS PER YR):
JOB PERFORMED:		
PPE USED:		

III. SURVEY INSTRUMENT INFORMATION

INSTRUMENT:	MODEL:						SERIAL#:					
FACTORY CALIBRATION DATE:	PRE-CAL: BY:						POST CAL: BY:					
BATTERY CHECK (Y/N):		125	250	500	1000	2000		125	250	500	1000	2000
CALIBRATOR SERIAL #:	dBA						dBA					
	dBC						dBC					

IV. SAMPLING INFORMATION & RESULTS

Response: ___FAST ___SLOW WIND SCREEN: Y N

TIME	LOCATION OF SAMPLE READING	SPL READING dBA	SPL READING dBC	COMMENTS, SPECIAL CONDITIONS, and/or STATUS OF SOURCE

_____Additional Data on back of form

V. CONCLUSIONS & RECOMMENDATIONS

Return completed form to: SHSD IH Lab FILE CODE: IH96SR. FORM IH96 Area Survey (03/01)

IV. SAMPLING INFORMATION & RESULTS (continued)

Response: ___FAST ___SLOW WIND SCREEN: Y N

TIME	LOCATION OF SAMPLE READING	SPL READING dBA	SPL READING dBC	COMMENTS, SPECIAL CONDITIONS, and/or STATUS OF SOURCE

Additional Data on back of form

SKETCH OF SAMPLING AREA (OPTIONAL)

Noise and Hearing Conservation
Operation of the General Radio 1956B Meter

BROOKHAVEN NATIONAL LABORATORY

Job Performance Measure (JPM) Completion Certificate

Candidate's Name	Life Number:

Practical Skill Evaluation: Demonstration of Evaluation Methodology by Oral Exam

Criteria	Qualifying Performance Standard	Unsat.	Recov.	Satisf.
1. Hazard Analysis	Understands the need to perform a hazard analysis of the area and potential exposure to the self as sampler and workers in the area.			
2. Personal Protective Equipment	Understands the need to be aware of the potential surface contamination, airborne levels of contaminants, radiological hazards, and noise hazard. Knows how to determine the need for PPE.			
3. Sampling Equipment	Knows where equipment needed for the procedure is located and how to properly sign it out.			
6. Operating Parameters	Knows the theory to establish operating parameters (safety envelope) for the equipment.			
7. Documentation	Demonstrates correctly filling out IH monitoring forms.			

IH Noise Meter Operation - Practical Skill Evaluation: Demonstration of Methodology

Criteria	Qualifying Performance Standard	Unsat.	Recov.	Satisf.
1. Turning the Meter On and Off	Demonstrates correctly activating the meter and turning it off			
2. Calibration of the Meter	Demonstrates correctly calibrating/bump checking the meter			
3. Clearing Stored data	Demonstrates the correctly to erase stored data			
4. Operation of taking a reading	Demonstrates correctly hold the meter, and the correct settings			
5. Downloading stored data	Demonstrates correctly extracting stored data from the meter to paper printout and electronic storage.			
6. Clearing data after downloading	Demonstrates correctly for removing stored data for the next user.			

I accept the responsibility for performing this task as demonstrated within this JPM and the corresponding SOP.

Candidate Signature:	Date:

I certify the candidate has satisfactorily performed each of the above listed steps and is capable of performing the task unsupervised.

Evaluator Signature:	Date: